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Effects of Habitat Fragmentation on Birds in Western Landscapes: Contrasts with Paradigms from the Eastern United States

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Reviews



Edited by R. Todd Engstrom

The following critiques express the opinions of the individual evaluators regarding the strengths, weaknesses, and value of the books they review. As such, the appraisals are subjective assessments and do not necessarily reflect the opinions of the editors or any official policy of the American Ornithologists' Union.

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The American Bird Conservancy Guide to the 500 Most Important Bird Areas in the United States.—Robert M. Chipley, George H. Fenwick, Michael J. Parr, and David N. Pashley. 2003. Random House, New York. x + 518 pp., 72 color illustrations. ISBN 0-8129-7036-5. Paperback, $25.95.—The Important Bird Area (IBA) concept originated in Europe and was developed by BirdLife International in the 1980s as a worldwide effort. The purpose of the IBA effort is to identify the globally most-significant sites for birds. The American Bird Conservancy (ABC) contribution began in 1995, with a focus on sites of global, continental, and national significance. This book, a description of what were judged by the authors to be the 508 most important bird areas in the United States, is a summary of that effort.

Site descriptions are organized by ecologically relevant units known as Bird Conservation Regions (BCRs), which roughly correspond to physiographic regions. That approach conforms to the organizational approach of the North American Bird Conservation Initiative, in which large-scale bird conservation plans have been developed and are being implemented by BCR. The book is thus divided into 37 such BCR chapters, with multiple sites in each. At the beginning of each chapter is an attractive map of the BCR, with sites identified by number, and a brief ecological description of the BCR. One to several of Marcia Poling's simple yet effective color illustrations appear in each chapter, making the volume attractive as well as informative.

The IBA descriptions include site highlights, general location, size, ownership, habitats, land use, site description, birds found there, conservation issues, and visitor information. Thus, birders using the book will be exposed to important features of land management, such as ownership, land use, and conservation issues. I did not read every IBA account. Rather, I read those with which I was very familiar (about 50) and a random sample of others (about 50). I found the descriptions of the sites I knew to be very good, capturing the most important ecological and ornithological features of the sites. However, as I read some of the Alaska site accounts, I could not help but think that virtually all the potential sites along Alaskan coast are more important ornithologically than our own little Cumberland Island. But I guess that is part of the challenge of an IBA effort; one has to find a balance between relatively large undeveloped sites in the west and smaller sites that become critically important in the face of extreme human development in other regions.

Sites were chosen that contained habitat supporting either ABC Green List species or large concentrations of breeding, migrating, or wintering birds. The former category includes only the most important known sites for 187 species (plus 33 Hawaiian species). That list is divided into three concern levels and largely follows the Watchlist approach developed by Partners in Flight, but includes all birds, not just land birds. The latter category ignores superabundant pest species like blackbirds, gulls, and some waterfowl. Good examples of important concentration sites include important waterbird nesting colonies, raptor migration routes, migratory bird stopover sites, and sites belonging to the Western Hemisphere Shorebird Reserve Network. There is a bias toward public land, which is understandable, because most of our undeveloped lands are in the public domain.

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However, that approach overlooks some important areas, such as the Red Hills of Southern Georgia and Northern Florida, an important conservation area for longleaf pine–wiregrass systems and the birds they contain. Is that because of an oversight, or because the region was judged as less important, or because it is a mosaic of privately owned lands mostly inaccessible to birders? Other private lands are included as parts of regions, such as the mouth of the Altamaha River in Georgia, or the ACE Basin in South Carolina. But this is a minor criticism; everybody will probably have one or two favorite sites that were not included for one reason or another.

So, is this book written for birders or for those primarily interested in conservation? The answer, happily, is yes. Birders primarily interested in learning more about great places to bird and what they can expect to see there will be pleased to have so much information in one book. But there is also a conservation theme throughout, so birders will learn a great deal about the state of bird conservation in the U.S. as of 2003, as will conservation biologists.

There are some other features of this book that I really liked. Paul Ehrlich provides a nice foreword that focuses on the relationship between birding, bird conservation, and conservation of biodiversity. The theme that birds can serve as catalysts for conservation is repeated throughout the book. Also, a series of boxed essays, almost all of which cover conservation topics such as important legislation, conservation planning, and management of individual species or ecosystems, are found throughout the book in appropriate places. They provide the reader who is uninformed about bird conservation with a lot of important information; anyone who reads this book hoping to find out about great birding spots will also come away from it much better informed about the state of the art regarding bird conservation in the beginning of the 21st century.

In my opinion, all birders should be conservationists. And all conservationists, and the political decision-makers they seek to influence, should recognize the enormous economic and political force made up by those who like to watch birds. I strongly recommend this book for birders and conservationists, and it would not hurt if a few politicians read it as well.—Robert J. Cooper, *Daniel B. Warnell School of Forest Resources, University of Georgia, Athens, Georgia 30602, USA. E-mail: rcooper@smokey.forestry.uga.edu*

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Effects of Habitat Fragmentation on Birds in Western Landscapes: Contrasts with Paradigms from the Eastern United States.—T. Luke George and David S. Dobkin, Eds. 2002. Studies in Avian Biology No. 25, Cooper Ornithological Society. x + 270 pp. ISBN 1-891276-34-4. Paper, $22.—From numerous fragmentation studies over recent decades, ecologists have developed substantial empirical and theoretical foundations for understanding consequences of habitat fragmentation for bird populations. However, this book casts that understanding as an "eastern paradigm" of fragmentation, given that it was developed largely from studies in the eastern United States. The eastern paradigm of fragmentation may not be easily generalized to western North America, because western landscapes are dominated by different land uses and exhibit a higher degree of natural heterogeneity resulting from disturbance regimes and topography. What is lacking in ecological and ornithological literature is a careful examination of the extent to which western bird communities conform to the eastern paradigm of fragmentation, and that is precisely the intent of this well-edited book.

George and Dobkin have assembled 15 contributions from participants of a 1999 symposium at the annual meeting of the Cooper Ornithological Society. Indeed, they have attracted an impressive group of contributors, who are highly regarded scientists working on fragmentation issues in North America. The book is grouped into three sections that cover theory and continental-scale comparisons, effects of fragmentation in specific western ecosystems, and studies of focal species.

The book's theoretical and conceptual contributions should be valuable for anyone interested in fragmentation, even for those working only in eastern ecosystems. On the basis of studies of birds in eastern forests, F. R. Thompson III, T. M. Donovan, R. M. DeGraaf, J. Faaborg, and S. K. Robinson propose a hierarchical model for

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effects of forest fragmentation where large-scale phenomena (e.g. regional or landscape patterns in cowbird abundance) provide constraints or context for smaller-scale effects (e.g. how nest sites affect probability of brood parasitism). The conceptual framework and testable hypotheses they propose are especially useful tools for ecologists working on habitat fragmentation as well as other landscape-scale issues. A. B. Franklin, B. R. Noon, and T. L. George review the concepts of habitat loss, habitat fragmentation, and habitat heterogeneity and find that the terms are often applied so generally that they have lost much of their usefulness. To remedy that, the authors suggest an approach to developing situational definitions of fragmentation based on explicitly defining what is being fragmented; the scale, extent, and pattern of fragmentation; and the mechanisms causing it. T. D. Sisk and J. Battin review the literature on edge effects in western ecosystems and discuss possible mechanisms that may create the different types of edge effects often described in studies. From their review, it is clear that little research on edge effects has occurred in the western United States. In addition, most research has emphasized forest edges, overlooking other common types of habitat edges. The authors also show that few species- and community-level responses to edges are consistent across landscapes or regions.

The broad-scale, continental comparisons presented in the book are also important contributions to the habitat-fragmentation literature. In their review, M. L. Morrison and D. C. Hahn find that the response of Brown-headed Cowbirds (*Molothrus ater*) to fragmentation in eastern and western landscapes is remarkably similar in that the key factor influencing presence and parasitism patterns was proximity of feeding areas. They propose that the broad east–west contrast in cowbird abundance and parasitism is at least partly related to time since fragmentation occurred, rather than different responses of cowbirds to fragmentation *per se*. Having examined >10,000 nests of 23 focal species from the Breeding Biology Research Database, J. F. Cavitt and T. E. Martin show that effects of fragmentation are not consistent across eastern and western regions. Most notably, they found that forest fragmentation tended to increase both brood-parasitism and nest-predation rates east of the Rockies, but not in the West. In fact, rates of nest predation were inversely related to fragmentation in the West, a result consistent with the findings of Tewksbury et al. (1998). Using data from the "Birds in Forested Landscapes" project of the Cornell Laboratory of Ornithology, R. S. Hames, K. V. Rosenberg, J. D. Lowe, S. E. Barker, and A. A. Dhondt found that tanagers and thrushes in both the eastern and western United States display similar negative responses to fragmentation, despite greater numbers of avian and mammalian predators in the east. Interestingly, they show that Brown-headed Cowbirds had a stronger positive response to fragmentation in the west than in the east.

Several contributions focus on specific western ecosystems, including coastal redwood forests (T. L. George and A. Brand), coastal coniferous forests of the Pacific Northwest (D. A. Manuwal and N. J. Manuwal), conifer forests of the north-central Rocky Mountains (S. J. Hejl, D. E. Mack, J. S. Young, J. C. Bednarz, and R. L. Hutto), intermountain shrub-steppe habitat (S. T. Knick and J. T. Rotenberry), urbanizing landscapes of southern California (D. T. Bolger), and western riparian systems (J. J. Tewksbury, A. E. Black, N. Nur, V. A. Saab, B. D. Logan, and D. S. Dobkin). And no volume on fragmentation of western ecosystems would be complete without some discussion of the Spotted Owl (*Strix occidentalis*; A. B. Franklin) and Marbled Murrelet (*Brachyramphus marmoratus*; M. G. Raphael, D. E. Mack, J. M. Marzluff, and J. M. Luginbuhl). For land managers, the chapter covering consequences of fire and salvage logging for bird communities (by N. B. Kotliar, S. J. Hejl, R. L. Hutto, V. A. Saab, C. P. Melcher, and M. E. McFadzen) is timely, given the new government-sanctioned programs of prescribed burning, fuel reductions, and salvage logging in western forests.

Because this book combines theoretical and broad-scale treatments of fragmentation with habitat-based studies, there seems to be something for everyone. The authors take a variety of methodological approaches for papers, which include topic reviews, meta-analyses, and original research. Within each paper, the authors synthesize previous studies of their focal ecosystem or species. Most papers emphasize the effects of fragmentation on abundance, nest predation, and brood parasitism, but there are a few notable exceptions. For example, Knick and Rotenberry propose that alternative

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mechanisms, such as lack of natal philopatry and dispersal behavior, might constrain avian community structure in intermountain shrub-steppe habitats. Bolger highlights the importance of bottom-up mechanisms (e.g. availability of arthropod prey), which may cause area-sensitivity and edge-avoidance in birds of coastal sage scrub and chaparral habitats in urbanizing southern California.

The book is organized as a series of independent papers rather than interwoven chapters that build on one another. One criticism is that it lacks a chapter that synthesizes findings from individual papers, but that is often true of edited works. Such a summary chapter would be especially useful to provide context and discussion of some of the contradictory findings (e.g. conflicting regional patterns of cowbird abundance and brood parasitism). The overarching purpose of the book—to evaluate whether the eastern paradigm of fragmentation fits western bird populations—has been addressed but not completely resolved. Nevertheless, the book provides an excellent literature review and presents new research findings that will prove useful to ecologists—scientists, managers, and students alike. For most readers, the thoughtful coverage will also challenge our preconceptions of fragmentation and stimulate new discussions on this important topic.—Amanda D. Rodewald, *School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, Ohio 43210, USA. E-mail: rodewald.1@osu.edu*

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Essentials of Conservation Biology (3rd ed.).—Richard B. Primack. 2002. Sinauer Associates, Sunderland, Massachusetts. 698 pp. ISBN 0-87893-719-6. Cloth, $72.95.—This is one of five current textbooks (that I am of aware of) on conservation biology. *Essesntials of Conservation Biology* was first published in 1993 (the second edition in 1998) and was the first textbook to focus on the subject. Conservation biology, as a scientific discipline, is still very young—barely >15 years old. Of course, many essential facets of the subject are as old as biology or its many subdisciplines, such as ecology, evolution, behavior, genetics, or specialties like ornithology. All are extremely critical to conservation biology and are woven nicely into the book. The field of conservation biology has grown out of tremendous concern over the deterioration of the living world and especially the unprecedented loss of species and continued threats to biological diversity.

Overall, *Essentials of Conservation Biology* is very well written and organized. The subject matter is handled in a balanced way, with examples from many disciplines and biota. The book has six major parts: (I) Major Issues That Define the Discipline, (II) Valuing Biodiversity, (III) Threats to Biological Diversity, (IV) Conservation at the Population and Species Levels, (V) Practical Applications, and (VI) Conservation and Human Societies. Each of the 22 chapters is assembled around a theme and each includes a summary, a discussion section (which is a series of questions), and suggested readings. Each chapter has tables, figures, black-and-white illustrations, and "boxes" (a total of 31 in the book) that are sidebars of information on specific topics ranging from sea turtles, sharks, fungi, and butterflies, to scientists as activists and the cost of the Three Gorges Dam in China.

The book begins with a clear description of "What is Conservation Biology" and provides a solid introduction to the complexities associated with biological diversity (Chapters 1–3). There is early reference to Genesis and the Bible (on page 14), with a negative emphasis on the exploitative aspects of man's "dominion over every living thing that moves on earth." Unfortunately, not until Chapter 6 (page 144) is it pointed out that Genesis also describes our human responsibilities as stewards of the earth; those two references should have appeared together.

Two issues that are inadequately considered in the initial chapters are (1) "What is a Species?"—answered with only a brief description, and (2) the fact that ecological processes are part of most definitions of biological diversity. The definition of a species should have

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more detail because it is complicated and can be a contentious issue. Ecological processes are mentioned under Community Diversity but could be more explicitly included as a major component of biological diversity.

I applaud the early emphasis on the economics associated with conservation issues (Chapters 4–6). Economics and the monetary realities of conservation are extremely critical. Assigning monetary value to species is a controversial subject and difficult to accomplish. A nice example is included (in box 6) of calculating how much a species is worth.

Some of the text (e.g. box 5) has an advocacy tone. That might be criticized by some who would complain that the text is not objective and lacks a "value-neutral" perspective. The book comes nicely back to economic and social issues in the last section (Chapter 20), in the context of sustainable development.

The book summarizes many issues of importance to avian conservation and provides numerous avian examples. For instance, seven species of birds have gone extinct in North America since 1492 (Table 7.1); a total of 113 species of birds in the world have gone extinct since 1600 (Table 7.2); and 1,183 (fully 12%) of the 9,500 species of birds are now threatened with extinction (Table 7.3). The book also has a strong emphasis on habitat loss, habitat change, and landscape effects such as fragmentation; all issues that are very important to birds. The book is a bit weak on describing some of the complexities of landscape patterns. For instance, little distinction is made between permanent and temporary fragmentation, an important distinction in agricultural and urban landscapes as compared with forested regions. Most agriculture and urban habitats are permanent changes in the landscape, whereas logging in forests is temporary, albeit of relatively long duration. The statement that "98% of the forests of eastern North America were logged or cleared for farming…no bird species went extinct because of habitat loss" is a bit misleading. That no bird species went extinct is true, but 98% of the forests were not logged or cleared for farming simultaneously or in a short period. That conversion took place over decades, so there were still combinations of age-classes in the forests.

The author has done an excellent job of incorporating new literature published since the first and second editions in 1993 and 1998. The book has >1,200 literature citations, the great majority of them since 1993. The bibliography includes citations from a relatively limited number of journals, primarily conservation biology journals such as *Conservation Biology*, *Biological Conservation*, and *Biodiversity and Conservation*. Journals such as *Science*, *Nature*, *BioScience*, *Ecological Applications*, and *Trends in Ecology and Evolution* are frequently cited, but citations to relevant specialty journals or other journals besides those named above are infrequent. For example, in my perusal of the bibliography I noticed very few publications from ornithological journals; though numerous articles on birds were included from those listed above. Most of the publications and citations are also from journals published in the United States; however, the text includes broad representation of conservation examples from all over the world.

I was surprised or disappointed that several references were not discussed in more detail. For example, Rabinowitz's (1981) original work on the "seven routes to rarity" should be given more credit, and the prioritization scheme of Milsap et al. (1990) should be cited. The latter work is a good example of multitaxa priority-setting in conservation efforts that considers the degree of correlation among multiple measurements of conservation status for species. Also, Rahel's (2000) paper on the homogenization of fish communities in the United States resulting from exotic species introductions has a powerful message for fish conservation. More interpretation of Hubbell's (2001) theories or Bell's (2001) papers on biodiversity, biogeography, and neutral macroecology would be welcome additions, but perhaps those, as well as recent controversies about "cold spots," must wait until the fourth edition.

Aside from a few shortcomings, Primack has provided another excellent revision to his *Essentials of Conservation Biology.* The book has clearly met its mark of providing "a thorough introduction to the major concepts and problems of the field" and is ideal for an advanced undergraduate course or beginning graduate course in conservation biology. Overall, it is well edited (I found only one spelling error—the scientific name of the black-footed ferret). The publisher conservatively estimates that >60 universities are currently using the textbook, and it has been translated into numerous languages.

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I highly recommend this book to all students of ornithology and teachers of conservation biology.—Gerald J. Niemi, *Natural Resources Research Institute and Department of Biology, University of Minnesota, Duluth, Minnesota 55811, USA. E-mail: gniemi@d.umn.edu*

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Birds of the Yukon Territory.—Pamela H. Sinclair, Wendy A. Nixon, Cameron D. Eckert, and Nancy L. Hughes, Eds. 2003. University of British Columbia Press, Vancouver, British Columbia. 595 pp., 400 color photographs, 223 illustrations, 225 graphs. ISBN 0-7748-1012-2. Cloth, Canadian $125.00.—At 482,000 km^2, Canada's Yukon Territory is larger than all American states except Alaska and Texas. Yet, with a population of 28,500, Yukon residents could not fill a midsized college football stadium. The Ornithological Societies of North America (OSNA) membership directory includes just one entry for the Yukon, and the Yukon Bird Club has existed only since 1993. Despite those daunting statistics, the editors have created a work of exceptional value. Each is a biologist with the Yukon Department of Environment or the Canadian Wildlife Service. This book was obviously a work of passion, and its high quality suggests that it was inspired by the equally impressive four-volume *Birds of British Columbia*.

Five of Canada's 15 ecozones are represented in the Yukon, and large areas are in a mostly undisturbed state. The Yukon represents a large portion of the North American distribution of some species, including the Golden-crowned Sparrow (*Zonotrichia atricapilla*), Harlequin Duck (*Histrionicus histrionicus*), and Trumpeter Swan (*Cygnus buccinator*). Although some bird species are found in high densities, including the Rough-legged Hawk (*Buteo lagopus*), Black Guillemot (*Cepphus grylle*), and Peregrine Falcon (*Falco peregrinus*), the general theme of Yukon ornithology must be "nesting birds are widely scattered, and in some cases, sparsely distributed."

The introduction describes what a visitor to the Yukon can expect, including an impressive range of species and subspecies that might be commonly thought of as residents of eastern North America. That is followed by a concise and readable description of the territory's physical geography and natural history, and of the 140-year history of bird study in the Yukon. A month-by-month summary of bird highlights is provided, as is a six-page discussion of bird conservation priorities in the region.

The book's greatest strength is its treatment of the 288 bird species known from the Yukon, 223 of which occur there regularly. Most species are described in two pages, though particularly common and well-studied species, such as the Spruce Grouse (*Falcipennis canadensis*), Dark-eyed Junco (*Junco hyemalis*), and Common Redpoll (*Carduelis flammea*), receive a third page. Each account describes distribution and seasonal abundance, textually and with illustrations, records of breeding activity, habitat use, and particularly noteworthy records. Accompanying color photographs of birds and habitat, all taken in the Yukon, are of uniformly high quality. In particular, Cameron Eckert would likely do well as a full-time nature photographer. Sidebars concerning the role of birds in Yukon First Nations culture and history are particularly engaging. The book does not borrow heavily from the *Birds of North America* species accounts or Godfrey's *Birds of Canada*, but rather summarizes material from less accessible sources, such as Wildlife Service reports, as well as introducing previously unpublished data. Appendices provide First Nations and Inuvialut bird names and results of breeding-bird surveys and Christmas bird counts.

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Much of the Yukon is wilderness, and most bird records are from regions accessible only by the Yukon's few highways, and from the Old Crow area and the North Coast. Many readers will be surprised by the large gaps in our understanding. It is not unusual to read that breeding of a particular species was not documented until the 1940s or 1950s, or that only a handful of breeding records exists for even common and widespread species. For many readers, the description of the gaps in our knowledge of Yukon bird life will be as valuable as the presentation of material gathered to date. This book might serve as an inspiration for some ornithologists to move their research efforts north.—Glen Chilton, *Department of Biology, 14500 Bannister Road, S.E., St. Mary's College, Calgary, Alberta T2X 1Z4, Canada. E-mail: glen.chilton@stmc.ab.ca*

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